ANNUAL REPORT
JULY 2014 THROUGH JUNE 2015
MALIBU ROAD LANDSLIDE ASSESSMENT DISTRICT
MALIBU, CALIFORNIA

Prepared for:
CITY OF MALIBU

November 2015
Fugro Project No. 04.62140604
November 4, 2015
Project No. 04.2140604

City of Malibu
23825 Stuart Ranch Road
Malibu, California 90265

Attention: Mr. Rob Duboux

Subject: Annual Report, July 2014 through June 2015, Malibu Road Landslide Assessment District

Dear Mr. Duboux,

Fugro is pleased to present this annual report for the Malibu Road Landslide Assessment District. This report summarizes the monitoring and maintenance activities completed during the period of July 2014 through June 2015.

Fugro appreciates the opportunity to be of service to the City of Malibu and the District homeowners. Please contact Chris Dean at (310) 456-2489, x306 or Loree Berry at (805) 289-3830 if you have any questions regarding this report.

Sincerely,

FUGRO CONSULTANTS, INC.

Christopher Dean, C.E.G. Loree A. Berry, P.E.
Associate Geologist/Program Manager Senior Engineer/Project Manager

Nicholas Simon
Staff Geologist/Lead Technician

Copies Submitted: (1) Addressee and PDF
(2) City of Malibu - Geotechnical Staff and PDF
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1.0 INTRODUCTION

1.1 AUTHORIZATION

Fugro performed the work summarized in this report in accordance with our contract with the City of Malibu (City) and consistent with the cost estimate document "Exhibit A - FY 2014-2015 Maintenance Cost Estimate" presented in the Annual Assessment Report (Taussig, 2014).

1.2 BACKGROUND

The Malibu Road Landslide Assessment District (Assessment District) was established in 1981 by the County of Los Angeles (County) following the activation of a landslide on the west end of Malibu Road in 1978 (Plates 1 and 2). The assessment district provides permanent funding to maintain and monitor dewatering facilities with the purpose of stabilizing the landslide to the extent feasible using dewatering methods only. The County administered the assessment district until 1991 when the City incorporated. The Assessment District was reauthorized in May 1998 under Resolution No. 98-036. The City has administered the assessment district, utilizing consultants to maintain and monitor the district facilities.

1.3 SCOPE OF WORK

This annual report summarizes the monitoring and maintenance of the geotechnical instrumentation and dewatering facilities within the Malibu Road Assessment District for the period between July 1, 2014, and June 30, 2015 (hereafter, the "monitoring period").

Routine monitoring data collected during the current monitoring period included the following:

- Review of annual rainfall data from a local rain gauge operated by the County of Los Angeles, Department of Public Works - Water Resources Division;
- Monthly groundwater level measurements from nine standpipes
- Periodic groundwater measurements from nine pneumatic piezometers;
- Monthly dewatering production readings from ten dewatering wells owned by the Assessment District and three wells owned by a private homeowner on Bayshore Drive;
- Monthly dewatering production readings from 23 horizontal drains (hydraugers);
- Quarterly ground deformation measurements from five slope inclinometers; and
- Periodic maintenance of dewatering and monitoring facilities.

The operating condition of the instrumentation and dewatering facilities was checked during each field monitoring/observation visit and by evaluating preliminary data in the office as they were received. Maintenance was performed as-needed based upon the field observations.
and preliminary data evaluation, and correspondence from concerned homeowners and tenants.

The scope of services includes monitoring and maintenance of the assessment district facilities. The services provided on an annual basis for the assessment district do not include an engineering evaluation of the stability of the landslide.

1.4 REPORT ORGANIZATION

This report summarizes the monitoring data collected during the current monitoring period and presents conclusions regarding the annual monitoring results. The location of the assessment district is illustrated on Plate 1 - Site Location Map. Locations of the geotechnical instrumentation are shown on Plate 2 - Assessment District Map. Tabulated and graphic summaries of monitoring data are presented in Appendix A through Appendix C as indicated in the Table of Contents.

1.5 REPORT AVAILABILITY

The annual Assessment District reports are available for review at Malibu City Hall. Reports may also be viewed on the City's website at http://www.malibucity.org.

2.0 MONITORING

2.1 RAINFALL DATA

Rainfall totals were tabulated based exclusively on recorded values from the Los Angeles County Rainfall Station 1239 located at Big Rock Mesa since 2004 and on an average of three Rainfall Stations referred to as the “Malibu Area” between 1968 and 2004. A graph of historical monthly rainfall and average annual rainfall through September 30, 2015 is shown on Plate 3 - Rainfall Graph.

Rainfall data indicate that approximately 8.70 inches of precipitation fell during the monitoring period from July 1, 2014 through June 30, 2015. The average annual rainfall from 1968 to 2015 in the “Malibu Area” for the monitoring period is approximately 15.6 inches.

Rainfall data are usually analyzed in terms of the annual “rain season” that covers the time period from October 1 through September 30. Rainfall for October 1, 2014, through September 30, 2015, was approximately 10.75 inches. This is approximately 33 percent of the average annual rainfall of 16.0 inches for the “rain seasons” between 1968 and 2015.

2.2 GROUNDWATER MONITORING

The groundwater level data collected during the current monitoring period are summarized in Appendix A. Groundwater levels fluctuate throughout the year and from year to year in response to natural and man-made influences. The primary natural influence is varying precipitation. Man-made influences include:
- Recharge from septic systems;
- Recharge from irrigation;
- Alterations to surface drainage by grading, landscaping, storm drains, and rain gutters;
- Accidental water discharges from leaking utilities (water, irrigation, sewer, storm drain), and swimming pools; and
- Dewatering activities including pumping dewatering wells and Hydraugers.

Typically, groundwater levels rise relatively quickly following significant rainfall and gradually lower after the wet season ends. Groundwater levels measured in standpipe piezometers (wells) and pneumatic piezometers are depicted on Plates A-3 through A-5 in Appendix A. Groundwater levels at Malibu Road typically peak around late-March to mid-April and gradually decline through late September to November.

A summary graph of mean high groundwater elevations for Malibu Road is presented on Plate 5 - Groundwater Levels, Dewatering, and Rainfall. Plate 5 also shows the average dewatering output (gpd) and the deviation from the mean annual rainfall. The mean annual rainfall used for the chart was computed using all of the data from 1988 through the present. This graph illustrates that, since 2010-2011, annual rainfall has been generally decreasing. During the same period, the average dewatering output has been decreasing.

2.2.1 Standpipe Piezometers

Eight standpipe piezometers (W-2A, PZ-A, PZ-B, PZ-C, PZ-D, PZ-E, SI-5, and SI-6) were measured regularly over the monitoring period. Standpipe W-3A has not been located and is presumed to be buried under soil creeping down the slope on the North side of Malibu Road. Slope inclinometers/piezometers SI-5 and SI-6 were installed in 1998 along Bayshore Drive. Los Angeles County installed the other piezometers at earlier dates. The locations of the standpipe piezometers are depicted on Plate 2 - Assessment District Map, and groundwater hydrographs are presented in Appendix A.

2.2.2 Pneumatic Piezometers

Inclinometers installed within the assessment district after 1997 were typically outfitted with one or two pneumatic piezometer sensors. Each sensor records groundwater elevations by measuring differential air pressure between the instrument sensor and groundwater surface across a flexible bladder. In consideration of the generally declining groundwater levels, low rainfall, and close proximity of standpipe piezometers to pneumatic piezometers, the pneumatic water levels were monitored only intermittently throughout the monitoring year. All Pneumatic piezometers were assessed for functionality and it was determined that only SI-4 Tip-1, SI-5 Tips 1 and 2, and SI-6 Tip 2 are still functioning. June 2015 data for the functioning pneumatic piezometers is included in the report. The locations of the piezometers are depicted on Plate 2, and hydrographs are presented in Appendix A.
2.2.3 Groundwater Level Discussion

The groundwater data were reviewed by evaluating changes that occurred during the current monitoring period as well as changes in groundwater levels over extended periods. To analyze trends in seasonal groundwater fluctuations, the average (mean) annual and highest annual recorded groundwater elevation for each piezometer was calculated (Plate A-2).

Groundwater levels rose significantly immediately following the record rainfall in the winter of 2004 to 2005 (37.6 inches). Since about mid-2005, groundwater levels in the eastern and western portions of the district under Malibu Road had been slowly rising, while levels in the central portion of the district under Malibu Road had remained the same. Groundwater levels under Bayshore Drive have generally decreased since mid-2005. Over the last monitoring period, groundwater levels under the East and West ends of the Malibu Road section of the assessment district (PZ-D, PZ-E, and PZ-A) have decreased about three feet and the groundwater level in W-2A at the west end has decreased below the bottom of the well. W-3A, at the west end cannot be located and is buried under slump debris. Groundwater levels in standpipe piezometers under the middle section of the assessment district along Malibu Road (PZ-B and PZ-C) are both increasing despite the below average rainfall. The water levels in PZ-C have been increasing since 2013, which may be related to a decreased production in nearby dewatering well W-5. Dewatering well, W-5 has decreased production from an average of 460 gpm in the 2012-2013 monitoring year to 3.0 gpm over the last monitoring year. Similarly, PZ-B is located adjacent to dewatering well W-10. W-10 stopped producing in February 2015. Groundwater levels at SI-5 have decreased significantly following the installation of the replacement dewatering well, W-14, in October 2008.

The average and highest annual groundwater levels are provided on Plate A-2 and summarized in Table 1, below. Both the average and peak groundwater elevations have decreased since the prior year.

<table>
<thead>
<tr>
<th>Location</th>
<th>Average Groundwater El. 2014-2015</th>
<th>Change from Prior Year Average</th>
<th>Peak Groundwater El. 2014-2015</th>
<th>Change from Prior Year Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malibu Road</td>
<td>5.9</td>
<td>-3.1</td>
<td>6.8</td>
<td>-2.9</td>
</tr>
<tr>
<td>Bay Shore Drive</td>
<td>21.0</td>
<td>-1.4</td>
<td>21.7</td>
<td>-1.6</td>
</tr>
</tbody>
</table>

Note: All units are in feet.

2.3 DEWATERING PRODUCTION

2.3.1 Dewatering Well Production

A graph of the production rate for all dewatering wells is presented on Plate 4. Graphs showing production rates of individual wells are provided in Appendix B. Production data for the dewatering wells indicates the following:
The average total well production rate for this monitoring period was approximately 292 gallons per day (gpd). That represents a decrease of about 35 percent from the previous monitoring period production rate of 452 gpd.

2.3.2 Hydrauger Production

A graph of the production rate for all hydraugers is presented on Plate 4. Graphs of individual production rates for all hydraugers are included in Appendix B. Data for the hydraugers indicates the following:

- The average production rate for all hydraugers over the monitoring period is approximately 194 gpd. This represents a decrease of approximately 57 percent from the average production rate of 449 gpd for the previous monitoring period.

2.3.3 Total Dewatering Production

A combined graph of the total dewatering rate for all dewatering wells and hydraugers is presented on Plate 4. Total dewatering production data for the hydraugers and wells indicates the following:

- The average total dewatering rate during the monitoring period was approximately 486 gpd. This represents a 46 percent decrease in the average rate relative to the 901 gpd average recorded during the previous monitoring period.

2.4 SLOPE INCLINOMETER MEASUREMENTS

Fugro monitored five slope inclinometers on a quarterly basis to check for subsurface ground deformation through June 2015. Slope inclinometer measurement plots are presented in Appendix C for each monitored inclinometer installation. Plots of slope inclinometer measurements (four plots for each monitored slope inclinometer) are presented in Appendix C. The first plot, for each inclinometer, shows the cumulative deflection and incremental deflection for the A-direction and the second plot shows the cumulative deflection and incremental deflection for the B-direction. Those two plots show approximately one curve per year from about 2006 through the current monitoring year. The third and fourth plots show displacement versus time for the same period, but all of the readings are included on those plots.

SI-1A was installed in August 2006 and has a baseline reading from September 2006. SI-2A was installed in September of the 2010-2011 monitoring year with a baseline reading in November 2010. SI-4A was installed in August 2012 as a replacement for SI-4 and has a baseline reading from September 2012.

Interpretation of inclinometer data along Malibu Road shows no clearly defined interpreted movement during the 2014-2015 monitoring year, except for SI-1A, which shows slow, steady movement at about 27 feet. Displacements appear to be less than 0.1 inch per year.
Inclinometers SI-5 and SI-6 are located on Bayshore Drive, upslope and outside the defined limit of the most recent 1998 movement. No significant movement was observed during this monitoring year in SI-5 or SI-6.

3.0 DEWATERING FACILITY MAINTENANCE

3.1 FACILITY MAINTENANCE

The operating status of each dewatering well and hydrauger was checked monthly. When necessary, repair work was scheduled and undertaken (typically within a matter of a few hours to a few days of identifying a problem). Generally, repairs and maintenance consisted of brush clearance around facilities and fixing broken hydraugers and conveyance lines.

3.2 CAPITAL IMPROVEMENT PROJECTS

No capital improvements were performed during the monitoring period.

3.3 MAJOR FACILITY REPAIR INVENTORY

Some maintenance and repair are of such a scope that they would exceed the normal maintenance budget. Those larger tasks are identified below and should be considered a priority when additional funding can be made available.

- Dewatering well W-5 had a sudden drop in production in August 2013. W-5 had been producing above 400 gpd consistently and is currently producing 3 gpd. This well should be evaluated by a well contractor to determine if it is operating with optimum efficiency or if it needs to be repaired, improved, or replaced.

- Dewatering well W-10 has had decreased production and has not produced any water since February 2015. This well should be evaluated by a well contractor to determine if it is operating at optimum efficiency or if it needs to be repaired, improved, or replaced.

- Dewatering Well W-12 has low production, however it cannot be inspected or have the water level directly measured due to a previous temporary repair. The well should be properly repaired by a well contractor and assessed for efficiency.

- The corrugated plastic conveyance lines extending from W-14 and W-12 are decomposed and could leak water back onto the subsurface. They should be replaced.

- All of the hydraugers in the assessment district show decreased production. Although some of the decrease can be attributed to lack of precipitation in the region, the hydraugers and conveyance lines should be maintained with routine flushing. They have not been cleaned/flushed since 2008.

- Standpipe piezometer W-3A and several hydraugers at the west end of the district along Malibu Road have been buried by soil creep and slumping. Those facilities require excavation by a backhoe or other similar equipment to expose them and to
properly inspect their condition. Cages or boxes should be constructed around the exposed facilities to protect them from future soil slumping. Ideally, the cut should be stabilized to prevent the soil creep/slumping from occurring.

4.0 SUMMARY AND CONCLUSIONS

The status of the Malibu Road Landslide Assessment District can be summarized as follows:

- The 2014 through 2015 monitoring year rainfall was below average with 8.70 inches of precipitation. Rainfall during the monitoring period was below the historical average of 16.0 inches per year measured from 1968 through 2015.

- Groundwater levels on Bayshore Drive and along Malibu Road with the exception of two locations near the center of the district have declined over the last monitoring year. Average daily dewatering production declined 46 percent from the previous monitoring year. This could be a reflection of the below-average rainfall these past two reporting years.

- Readings from SI-1A showed slow steady movement of less than 0.1 inch per year at a depth of 27 feet.

- Readings for the four remaining slope inclinometers show no clearly defined significant movement during the 2014 to 2015 monitoring year.

- Water conservation is encouraged throughout the Malibu Road area to reduce future groundwater level increases. Control of groundwater levels within the landslide area is critical to maintaining the stability of the slides. The following are suggested:
  1. Rain Gutters - Installation and Maintenance.
  2. Limit Irrigation.
  3. Use of low-flow toilet and plumbing fixtures.

- Groundwater production from existing dewatering wells and hydraulers should be expected to gradually decline over time as the efficiency of the wells and hydraulers decrease due to mineralization and aging of the facilities. This may contribute to reduced rates of groundwater lowering or localized increases in groundwater levels. Periodic maintenance of the existing facilities and replacement of older, worn-out pumps should improve the efficiency of the dewatering systems throughout the year, especially during and immediately following the rainy months.
5.0 REFERENCES


_____ (2009), "Annual Assessment District No. 98-3 (Malibu Road) FY 2009-10," dated June 8.


PLATES
Malibu Road Landslide Assessment District, City of Malibu
Project No. 04.62140604

Malibu Road Landslide Assessment District, City of Malibu
Project No. 04.62140604

SITE LOCATION MAP
Malibu Road Landslide Assessment District
Malibu, California

PLATE 1
Monitoring Period: July 2014 - June 2015 Total: 8.70"
Rain Season Period: October 2014 - September 2015 Total: 10.75"

Average Annual Rainfall "Malibu Area":
Monitoring Period = 15.6 in.
Rain Season = 16.0 in.

RAINFALL GRAPH
Malibu Road Landslide Assessment District
Malibu, California
TOTAL DISCHARGE - WELLS AND HYDRAUGERS
Malibu Road Landslide Assessment District
Malibu, California
* Graph shows the mean value of the highest groundwater elevations recorded for each standpipe piezometer during the monitoring year.

GROUNDWATER LEVELS, DEWATERING AND RAINFALL
Malibu Road Landslide Assessment District
Malibu, California
APPENDIX A
GROUNDWATER DATA
### MALIBU ROAD LAD - Standpipe Piezometer Information

<table>
<thead>
<tr>
<th>Standpipe ID</th>
<th>Previous Reference Elevation (8/91)</th>
<th>Updated Reference Elevation (4/00)</th>
<th>Casing Depth (ft)</th>
<th>Perforation Interval</th>
<th>Installed By</th>
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</thead>
<tbody>
<tr>
<td>W-2A</td>
<td>22.6</td>
<td>20.6</td>
<td>9.0</td>
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</tr>
<tr>
<td>W-3A</td>
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<td>20.5</td>
<td>32.5</td>
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</tr>
<tr>
<td>PZ-A</td>
<td>20.0</td>
<td>19.8</td>
<td>17.2</td>
<td>Unknown</td>
<td>LA COUNTY</td>
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<tr>
<td>PZ-B</td>
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<td>19.1</td>
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<td>LA COUNTY</td>
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<td>PZ-C</td>
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<td>Unknown</td>
<td>LA COUNTY</td>
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<tr>
<td>PZ-D</td>
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<td>Unknown</td>
<td>LA COUNTY</td>
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<td>PZ-E</td>
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<td>21.4</td>
<td>15.8</td>
<td>Unknown</td>
<td>LA COUNTY</td>
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<td>SI-5*</td>
<td>59.0</td>
<td>59.3</td>
<td>78.0</td>
<td>-19.0 to -14.0</td>
<td>BYA</td>
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<tr>
<td>SI-6**</td>
<td>57.0</td>
<td>58.0</td>
<td>78.0</td>
<td>-21.0 to -16.0</td>
<td>BYA</td>
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</tbody>
</table>

Note:  + Formerly designated as MR-5
++ Formerly designated as MR-6

### MALIBU ROAD LAD - Pneumatic Piezometer Information

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<th>Well Identification</th>
<th>Previous Reference Elevation (8/91)</th>
<th>Updated Reference Elevation (4/00)</th>
<th>Tip Depth (ft.)</th>
<th>Tip El. (ft)</th>
<th>Installed By</th>
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</thead>
<tbody>
<tr>
<td>SI-1*</td>
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<td>SI-2*</td>
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<td>SI-3*</td>
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<td>BYA</td>
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<td>SI-4</td>
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<td>43.9</td>
<td>-21.9</td>
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<tr>
<td>SI-5 Tip 1</td>
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<td>59.3</td>
<td>60</td>
<td>-1</td>
<td>BYA</td>
</tr>
<tr>
<td>SI-5 Tip 2</td>
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<td>59.3</td>
<td>40</td>
<td>19</td>
<td>BYA</td>
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<tr>
<td>SI-6 Tip 1*</td>
<td>57.0</td>
<td>58.0</td>
<td>60</td>
<td>-3</td>
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<tr>
<td>SI-6 Tip 2</td>
<td>57.0</td>
<td>58.0</td>
<td>40</td>
<td>17</td>
<td>BYA</td>
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<tr>
<td>SI-1A</td>
<td>20.0</td>
<td>20.0</td>
<td>50</td>
<td>-30</td>
<td>FUGRO</td>
</tr>
</tbody>
</table>

Note:  SI-1 thru SI-4 were previously designated MR98-1 thru MR98-4
SI-5 and SI-6 were previously designated MR-5 and MR-6

* Peizometer not functioning

PIEZOMETER INFORMATION
Malibu Road Landslide Assessment District
Malibu, California
### MALIBU ROAD LANDSLIDE ASSESSMENT DISTRICT - SUMMARY OF GROUNDWATER DATA

<table>
<thead>
<tr>
<th>Standpipe / Piezometer I.D.</th>
<th>Project No. 04.62140604</th>
<th>Malibu Road Landslide Assessment District, City of Malibu</th>
</tr>
</thead>
</table>

#### MALIBU ROAD - Standpipe Piezometers

<table>
<thead>
<tr>
<th>W-2A</th>
<th>Mean El.</th>
<th>Highest El.</th>
<th>Change vs. Prior</th>
</tr>
</thead>
<tbody>
<tr>
<td>W-3A</td>
<td>Mean El.</td>
<td>Highest El.</td>
<td>Change vs. Prior</td>
</tr>
<tr>
<td>PZ-A</td>
<td>Mean El.</td>
<td>Highest El.</td>
<td>Change vs. Prior</td>
</tr>
<tr>
<td>PZ-B</td>
<td>Mean El.</td>
<td>Highest El.</td>
<td>Change vs. Prior</td>
</tr>
<tr>
<td>PZ-C</td>
<td>Mean El.</td>
<td>Highest El.</td>
<td>Change vs. Prior</td>
</tr>
<tr>
<td>PZ-D</td>
<td>Mean El.</td>
<td>Highest El.</td>
<td>Change vs. Prior</td>
</tr>
</tbody>
</table>

#### Bayside Drive - Standpipe Piezometers

<table>
<thead>
<tr>
<th>S1</th>
<th>Mean El.</th>
<th>Highest El.</th>
<th>Change vs. Prior</th>
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<td>S1B</td>
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<td>Change vs. Prior</td>
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#### PIEMOTOMETER INFORMATION

Malibu Road Landslide Assessment District
Malibu, California
GROUNDWATER HYDROGRAPH
Malibu Road (West End)
Malibu Road Landslide Assessment District
Malibu, California

*Note: W-3A uncovered in Jan. ’99
GROUNDWATER HYDROGRAPH
Malibu Road (East End)
Malibu Road Landslide Assessment District
Malibu, California

Notes:
SI-1 thru SI-4 installed March '98.
SI-1 and SI-3 not plotted. Pneumatic piezometers not functioning.
GROUNDWATER HYDROGRAPH
Bayshore Drive
Malibu Road Landslide Assessment District
Malibu, California

Note: SI-5 and SI-6 installed Sept. '98
### MALIBU ROAD LAD - Dewatering Well Information

<table>
<thead>
<tr>
<th>Well ID</th>
<th>Vault Elevation (ft.)</th>
<th>Bottom Elevation (ft.)</th>
<th>Pump Elevation (ft.)</th>
<th>Pump Size (hp)</th>
<th>2014-2015 Mean Pumping Rate (gpd)</th>
<th>% of Total Well Production</th>
<th>Installed By</th>
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<tbody>
<tr>
<td>W-3</td>
<td>19.5</td>
<td>-4.0</td>
<td>Unknown</td>
<td>1/2</td>
<td>105</td>
<td>36%</td>
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<tr>
<td>W-4</td>
<td>20.0</td>
<td>-9.0</td>
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<td>6</td>
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<td>LA Co.</td>
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<tr>
<td>W-5</td>
<td>19.0</td>
<td>-9.5</td>
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<td>1/2</td>
<td>3</td>
<td>1%</td>
<td>LA Co.</td>
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<td>W-6</td>
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<td>W-12</td>
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<td>7</td>
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<td>W-14</td>
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### MALIBU ROAD LAD - Hydraulger Information

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<th>Hydraulger ID</th>
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<th>Bearing</th>
<th>Functional Length* (ft)</th>
<th>2014-2015 Mean Flow Rate (gpd)</th>
<th>% of Total Production</th>
<th>Installed By</th>
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<tr>
<td>HD-1</td>
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<td>74</td>
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<td>HD-23</td>
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<td>160</td>
<td>9</td>
<td>5%</td>
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</table>

Note: * Measured on 4/1/98 (except HD-22 and HD-23 installed 1/22/05)
DEWATERING WELL DISCHARGE RATE GRAPH

Bayshore Drive

Malibu Road Landslide Assessment District

Malibu, California
HYDRAUGER DISCHARGE RATE GRAPH
Malibu Road (West End)
Malibu Road Landslide Assessment District
Malibu, California
APPENDIX C
SLOPE INCLINOMETER DATA
### MALIBU ROAD LAD - Slope Inclinometer Interpretation Summary

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<td>Interpreted Rupture Depth (ft)</td>
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<td>23-30</td>
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<td>28-32</td>
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**Notes:**
- **D** Destroyed
- **F** Functioning
- **NI** No information
- **NR** No reading
- ~ 0.1 * Indicated displacement is less than reliable instrument accuracy. Interpreted movement is theoretical.
- (1) Readings only through March 2004
- (2) Readings are through 2000, although majority of movement occurred in 1998
- (3) Inclinometer sheared off in January, 2005.
- (4) Inclinometer sheared off winter of 2009.

### SUMMARY OF SLOPE INCLINOMETERS
Malibu Road Landslide Assessment District
Malibu, California

PLATE C-1
Assessment District 98-3, Inclinometer SI-1A
City of Malibu
Sets marked * include zero shift and/or rotation corrections.
Displacements shown are in the A Direction

Assessment District 98-3, Inclinometer SI-1A

City of Malibu
Displacements shown are in the B Direction

Assessment District 98-3, Inclinometer SI-1A

City of Malibu
Assessment District 98-3, Inclinometer SI-2A
City of Malibu

Sets marked * include zero shift and/or rotation corrections.

C:\CADFiles\MalibuInclinometers\MalibuRoadInclinometer Data\MR 2014-2015 annual report\SI-2A.gtl
Assessment District 98-3, Inclinometer SI-2A
City of Malibu

Sets marked * include zero shift and/or rotation corrections.

C:\CADFiles\MalibuInclinometers\MalibuRoadInclinometer Data\MR 2014-2015 annual report\SI-2A.gtl
Displacements shown are in the A Direction

Assessment District 98-3, Inclinometer SI-2A

City of Malibu
Displacements shown are in the B Direction

Assessment District 98-3, Inclinometer SI-2A

City of Malibu
Assessment District 98-3, Inclinometer SI-4A
City of Malibu

Sets marked * include zero shift and/or rotation corrections.

C:\CADFiles\MalibuInclinometers\MalibuRoadInclinometer Data\MR 2014-2015 annual report\SI-4A.gtl
Displacements shown are in the A Direction

Assessment District 98-3, Inclinometer SI-4A

City of Malibu
Displacements shown are in the B Direction

Assessment District 98-3, Inclinometer SI-4A
City of Malibu
Assessment District 98-3, Inclinometer SI-5
City of Malibu

Sets marked * include zero shift and/or rotation corrections.

C:\CADFiles\MalibuInclinometers\MalibuRoadInclinometer Data\MR 2014-2015 annual report\SI-5.gtl
Malibu Road Landslide Assessment District, City of Malibu

Project No. 04.62.14604

Assessment District 98-3, Inclinometer SI-5
City of Malibu

Sets marked * include zero shift and/or rotation corrections.

Ref. Elevation ft

Fugro Consultants, Inc. - Ventura, CA
Displacements shown are in the A Direction

Assessment District 98-3, Inclinometer SI-5
City of Malibu
Displacements shown are in the B Direction

Assessment District 98-3, Inclinometer SI-5

City of Malibu
Assessment District 98-3, Inclinometer SI-6
City of Malibu

Sets marked * include zero shift and/or rotation corrections.
Assessment District 98-3, Inclinometer SI-6
City of Malibu

Sets marked * include zero shift and/or rotation corrections.

C:\CADFiles\MalibuInclinometers\MalibuRoadInclinometer Data\MR 2014-2015 annual report\SI-6.gtl
Displacements shown are in the A Direction

Assessment District 98-3, Inclinometer SI-6

City of Malibu
Displacements shown are in the B Direction

Assessment District 98-3, Inclinometer SI-6
City of Malibu